What is claimed is:

1. A plasma flat-panel display comprising:

a first transparent substrate comprising:

an array of pairs of parallel sustainer electrodes deposited upon said first substrate, each of said pairs of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

auxiliary electrodes deposited upon said first substrate parallel to and corresponding to each of said pairs of sustainer electrodes, at least a first auxiliary electrode being adjacent to a first sustainer electrode in each pair of sustainer electrodes;

a dielectric layer formed from a dielectric material covering said sustainer and auxiliary electrodes;

a further protection layer formed from an electron emissive material covering said dielectric;

a second substrate which is hermetically sealed to said first substrate comprising:

an array of micro-voids formed in the surface of said second substrate which is adjacent to said first substrate;

a plurality of address electrodes incorporated within said second substrate, each of said address electrodes orthogonal to said sustain electrodes and corresponding to each of said micro-voids, said micro-voids cooperating with said first substrate to define a plurality of sub-pixels, each of said sub-pixels defining a controlled discharge volume at the intersection of said address electrodes and sustainer electrode pairs with associated auxiliary electrodes;

a phosphor material deposited within each micro-void and associated with said address electrodes; and

a gas filling said micro-voids.

2. A plasma flat-panel display according to claim 1 wherein

each of said first sustainer electrodes are connected to corresponding first sustainer electrode pads, said sustainer electrode pads being adapted to be connected into at least one group, said group connected to a first sustainer voltage waveform supply;

each of said second sustainer electrodes are connected to corresponding second sustainer electrode pads, said sustainer electrode pads being adapted to be connected into at least one group, said group connected to a second sustainer voltage waveform supply of opposite phase from the first.

at least one of said auxiliary electrodes adjacent to each first sustain electrode is connected to an associated auxiliary electrode pad, said auxiliary electrode pads being adapted to be connected to a multiplicity of individually controllable first control voltage waveform supplies;

and each of said address electrodes is connected to a corresponding electrode pad, said address electrode pads being adapted to be connected to an individually controllable address voltage waveform supply substantially in phase with said first sustainer voltage waveform supply but at a lower voltage.

3. A plasma display according to claim 2 wherein

a second of said auxiliary electrodes adjacent to each second sustain electrode is connected to an associated auxiliary electrode pad, said second auxiliary electrode pads being adapted to be connected in common into at least one group to a second control voltage waveform supply operated substantially at opposite phase to said first control voltage waveform supplies.

4. A plasma flat-panel display according to claim 2 wherein

said first and second sustainer voltage waveform supplies apply voltage waveforms to said sustainer electrodes to sustain a plasma discharge sequence

between said first and second sustaining electrodes, the discharge path being controlled in position and shape by the auxiliary voltage waveforms, whereby the illumination of the associated sub-pixel may be enhanced.

5. A plasma display according to claim 4 wherein

said waveform supplies cooperate to apply voltage waveforms which eliminate any wall charge on the dielectric surfaces associated with all electrodes in a set-up period,

said address voltage waveform supplies cooperate with said first auxiliary voltage waveform supplies to apply voltages which selectively initiate a discharge in the controlled discharge volume between said first sustain electrode and second sustain electrode and allow collection of charge on the dielectric surfaces associated with first and second sustain electrodes in an amount substantially identical to that of normal sustaining in the controlled discharge volumes corresponding to selected sub-pixels in an addressing period, and

said voltage waveform supplies cooperate to create a predetermined number of sequential sustain discharges in the controlled discharge volume between said first and second sustain electrodes in sub-pixels which have stored charges on said associated dielectric surfaces of sustain electrodes in a sustain period.

6. A plasma flat-display panel according to claim 4 wherein said sustainer voltage waveforms are greater than 250 volts and further wherein said trigger voltages waveforms are less than 100 volts.

7. A plasma flat-display according to claim 5 wherein said sustainer voltage waveforms are in the range of 280 to 380 volts.

8. A plasma flat-display panel according to claim 1 wherein said auxiliary electrodes are positioned between said first and second sustain electrodes.

9. A plasma flat-display panel according to claim 1 wherein said auxiliary electrodes are positioned outside of said first and second sustain electrodes.

10. A plasma flat-display panel according to claim 1 wherein said sustain electrodes are of the same width, but different from the widths of the auxiliary electrodes.

11. A plasma flat-display panel accorting to claim 9 wherein said first and second sustain electrode pairs are alternately mirrored along the array of pairs such that a pattern of first-second-second-first sustain electrodes is formed and repeated throughout the array.

12. A plasma flat-panel display according to claim 11 wherein said auxiliary electrodes are commonly connected to a pad which is shared between two neighboring auxiliary electrodes, thus reducing the number of pads by half and corresponding auxiliary waveform voltage supplies by half.

13. A plasma flat-display panel according to claim 11 wherein said first sustain electrodes are commonly connected to a pad which is shared between two neighboring first sustain electrodes, and second sustain electrodes are connected to a pad which is shared between two neighboring second sustain electrodes, thus reducing the number of pads by half.

14. A plasma flat-panel display according to claim 3 wherein

said first and second sustainer voltage waveform supplies apply voltage waveforms to said sustainer electrodes to sustain a plasma discharge sequence between said first and second sustaining electrodes, the discharge path being controlled in position and shape by the auxiliary voltage waveforms, whereby the illumination of the associated sub-pixel may be enhanced.

15. A plasma display according to claim 14 wherein

said waveform supplies cooperate to apply voltage waveforms which eliminate any wall charge on the dielectric surfaces associated with all electrodes in a set-up period,

said address voltage waveform supplies cooperate with said first auxiliary voltage waveform supplies to apply voltages which selectively initiate a discharge in the controlled discharge volume between said first sustain electrode and second sustain electrode and allow collection of charge on the dielectric surfaces associated with first and second sustain electrodes in an amount substantially identical to that of normal sustaining in the controlled discharge volumes corresponding to selected sub-pixels in an addressing period, and

said voltage waveform supplies cooperate to create a predetermined number of sequential sustain discharges in the controlled discharge volume between said first and second sustain electrodes in sub-pixels which have stored charges on said associated dielectric surfaces of sustain electrodes in a sustain period.

16. A plasma flat-panel display comprising:

a first transparent substrate;

a first pair of parallel sustainer electrodes deposited upon said first substrate, said first pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

at least one auxiliary electrode deposited upon said first substrate parallel to said first pair of sustainer electrodes, one of said auxiliary electrodes being adjacent to said first sustainer electrode in said first pair of sustainer electrodes;

a second pair of parallel sustainer electrodes deposited upon said first substrate parallel to said trigger electrodes, said second pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode, said sustainer electrode pair being oriented upon said first substrate as a mirror image of said first sustainer electrode pair such that said first sustainer electrode in said second pair of sustainer electrodes is adjacent to said other of said trigger electrodes;

a single common first sustainer electrode pad electrically connected to said first sustainer electrode in said first sustainer electrode pair and said first sustainer electrode in said second sustainer electrode pair, said first sustainer electrode pad adapted to connected to a first sustainer voltage waveform supply whereby a single supply provides a first sustainer voltage waveform to both of said first sustainer electrodes;

a dielectric layer formed from a dielectric material covering said sustainer and trigger electrodes;

a protection layer formed covering said dielectric layer

a second substrate which is hermetically sealed to said first substrate, said second substrate having a plurality of micro-voids formed in a surface thereof which is adjacent to said first substrate, said micro-voids cooperating with said first substrate to define a plurality of sub-pixels;

a gas filling said micro-voids;

a phosphor material deposited within each micro-void; and

a plurality of address electrodes incorporated within said second substrate, each of said address electrodes corresponding to one of said sub-pixels.

17. A method of operating a plasma flat-panel display comprising the steps of:

(a) providing a plasma flat-panel display having:

a first transparent substrate;

a first pair of parallel sustainer electrodes deposited upon the first substrate, the first pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

at least one auxiliary electrode deposited upon the first substrate parallel to the first pair of sustainer electrodes, the auxiliary electrode being adjacent to the first sustainer electrode in the first pair of sustainer electrodes;

a second pair of parallel sustainer electrodes deposited upon the first substrate parallel to the trigger electrodes, the second pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode, the sustainer electrode pair being oriented upon the first substrate as a mirror image of the first sustainer electrode pair such that the first sustainer electrode in the second pair of sustainer electrodes is adjacent to the auxiliary electrode;

a single common first sustainer electrode pad electrically connected to the first sustainer electrode in the first sustainer electrode pair and the first sustainer electrode in the second sustainer electrode pair, the first sustainer electrode pad adapted to connected to a first sustainer voltage waveform supply whereby a single supply provides a first sustainer voltage waveform to both of the first sustainer electrodes;

a dielectric layer formed from a dielectric material covering the sustainer and trigger electrodes;

a protection layer formed covering the dielectric layer

a second substrate which is hermetically sealed to the first substrate, the second substrate having a plurality of micro-voids formed in

a surface thereof which is adjacent to the first substrate, the micro-voids cooperating with the first substrate to define a plurality of sub-pixels;

a gas filling said micro-voids;

a phosphor material deposited within each micro-void; and

a plurality of address electrodes incorporated within the second substrate, each of the address electrodes corresponding to one of the sub-pixels;

(b) applying in a set-up period first and second sustain, auxiliary, and address voltage waveforms to corresponding electrodes connected by pads to cause the setting of all wall charge on associated dielectric surfaces corresponding to the controlled discharge volumes of sub-cells to values appropriate to an "off" state;

(c) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled discharge volumes of selected sub-cells to values appropriate to an "on" state; and

(d) applying in a sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.

18. The method according to claim 17 wherein first and second voltage waveforms are of equal voltages and oppositely phased.

19. The method according to claim 17 wherein the voltage waveform generated by a first auxiliary waveform generators is substantially in phase with first sustain voltage waveform supplies and of less voltage.

20. The method according to claim 19 wherein the voltage waveform generated by a first auxiliary waveform generators is adjustable for optimum light output and efficiency.

21. A method of operating a plasma flat-panel display comprising the steps of:

(a) providing a plasma flat-panel display having

a first transparent substrate :

an array of pairs of parallel sustainer electrodes deposited upon said first substrate, each of said pairs of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

auxiliary electrodes deposited upon said first substrate parallel to and corresponding to each of said pairs of sustainer electrodes, at least a first auxiliary electrode being adjacent to a first sustainer electrode in each pair of sustainer electrodes;

a dielectric layer formed from a dielectric material covering said sustainer and auxiliary electrodes;

a further protection layer formed from an electron emissive material covering said dielectric;

a second substrate which is hermetically sealed to said first substrate comprising:

an array of micro-voids formed in the surface of said second substrate which is adjacent to said first substrate;

a plurality of address electrodes incorporated within said second substrate, each of said address electrodes orthogonal to said sustain

electrodes and corresponding to each of said micro-voids, said micro-voids cooperating with said first substrate to define a plurality of sub-pixels, each of said sub-pixels defining a controlled discharge volume at the intersection of said address electrodes and sustainer electrode pairs with associated auxiliary electrodes;

a phosphor material deposited within each micro-void and associated with said address electrodes; and

a gas filling said micro-voids;

(b) applying in a set-up period first and second sustain, auxiliary, and address voltage waveforms to corresponding electrodes connected by pads to cause the setting of all wall charge on associated dielectric surfaces corresponding to the controlled discharge volumes of sub-cells to values appropriate to an "off" state;

(c) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled discharge volumes of selected sub-cells to values appropriate to an "on" state; and

(d) applying in a sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.

22. The method according to claim 21 wherein first and second voltage waveforms are of equal voltages and oppositely phased.

23. The method according to claim 21 wherein the voltage waveform generated by a first auxiliary waveform generators is substantially in phase with first sustain voltage waveform supplies and of less voltage.

24. The method according to claim 23 wherein the voltage waveform generated by a first auxiliary waveform generators is adjustable for optimum light output and efficiency.

25. A plasma flat-panel display comprising:

a first transparent substrate;

a first pair of parallel sustainer electrodes deposited upon said first substrate, said first pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

at least one auxiliary electrode deposited upon said first substrate parallel to said first pair of sustainer electrodes, one of said auxiliary electrodes being adjacent to said first sustainer electrode in said first pair of sustainer electrodes;

a second pair of parallel sustainer electrodes deposited upon said first substrate parallel to said trigger electrodes, said second pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode, said sustainer electrode pair being oriented upon said first substrate as a mirror image of said first sustainer electrode pair such that said first sustainer electrode in said second pair of sustainer electrodes is adjacent to said other of said trigger electrodes;

a single common first sustainer electrode pad electrically connected to one end of said first sustainer electrode in said first sustainer electrode pair and said other end of first sustainer electrode being connected to a corresponding end of said first sustainer electrode in said second sustainer electrode pair;

a single common second sustainer electrode pad electrically connected to one end of said second sustainer electrode in said second sustainer electrode pair and said other end of second sustainer electrode being connected to a corresponding end of said second sustainer electrode in said first sustainer electrode pair;

a dielectric layer formed from a dielectric material covering said sustainer and trigger electrodes;

a protection layer formed covering said dielectric layer

a second substrate which is hermetically sealed to said first substrate, said second substrate having a plurality of micro-voids formed in a surface thereof which is adjacent to said first substrate, said micro-voids cooperating with said first substrate to define a plurality of sub-pixels;

a gas filling said micro-voids;

a phosphor material deposited within each micro-void; and

a plurality of address electrodes incorporated within said second substrate, each of said address electrodes corresponding to one of said sub-pixels.

26. The method according to claim 17 further including, subsequent to step (d), applying the following steps to erase the discharge contained in a selected sub-cell:

(e) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled discharge volumes of selected sub-cells to values appropriate to an "off" state; and

(d) applying in a subsequent sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.

27. The method according to claim 21 further including, subsequent to step (d), applying the following steps to erase the discharge contained in a selected sub-cell:

(e) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled discharge volumes of selected sub-cells to values appropriate to an "off" state; and

(d) applying in a subsequent sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.

28. A method of operating a flat plasma display comprising the steps of:

(a) providing a plasma flat-panel display having:
a first transparent substrate;

a first pair of parallel sustainer electrodes deposited upon the first substrate, the first pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

at least one auxiliary electrode deposited upon the first substrate parallel to the first pair of sustainer electrodes, the auxiliary electrode being adjacent to the first sustainer electrode in the first pair of sustainer electrodes;

a second pair of parallel sustainer electrodes deposited upon the first substrate parallel to the trigger electrodes, the second pair of sustainer electrodes including a first sustainer electrode and a second sustainer electrode, the sustainer electrode pair being oriented upon the first substrate as a mirror image of the first sustainer electrode pair such that the first sustainer electrode in the second pair of sustainer electrodes is adjacent to the auxiliary electrode;

a single common first sustainer electrode pad electrically connected to the first sustainer electrode in the first sustainer electrode pair and the first sustainer electrode in the second sustainer electrode pair, the first sustainer electrode pad adapted to connected to a first sustainer voltage waveform supply whereby a single supply provides a first sustainer voltage waveform to both of the first sustainer electrodes;

a dielectric layer formed from a dielectric material covering the sustainer and trigger electrodes;

a protection layer formed covering the dielectric layer

a second substrate which is hermetically sealed to the first substrate, the second substrate having a plurality of micro-voids formed in a surface thereof which is adjacent to the first substrate, the micro-voids cooperating with the first substrate to define a plurality of sub-pixels;

a gas filling said micro-voids;

a phosphor material deposited within each micro-void; and

a plurality of address electrodes incorporated within the second substrate, each of the address electrodes corresponding to one of the sub-pixels;

there being appropriated voltages applied to the electrodes to maintain an established plasma discharge in at least one sub-cell;

(b) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled discharge volumes of selected sub-cells to values appropriate to an "off" state; and

(c) applying in a subsequent sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.

29. A method of operating a flat plasma display comprising the steps of:

providing a plasma flat-panel display having

a first transparent substrate :

an array of pairs of parallel sustainer electrodes deposited upon said first substrate, each of said pairs of sustainer electrodes including a first sustainer electrode and a second sustainer electrode;

auxiliary electrodes deposited upon said first substrate parallel to and corresponding to each of said pairs of sustainer electrodes, at least a

first auxiliary electrode being adjacent to a first sustainer electrode in each pair of sustainer electrodes;

a dielectric layer formed from a dielectric material covering said sustainer and auxiliary electrodes;

a further protection layer formed from an electron emissive material covering said dielectric;

a second substrate which is hermetically sealed to said first substrate comprising:

an array of micro-voids formed in the surface of said second substrate which is adjacent to said first substrate;

a plurality of address electrodes incorporated within said second substrate, each of said address electrodes orthogonal to said sustain electrodes and corresponding to each of said micro-voids, said micro-voids cooperating with said first substrate to define a plurality of sub-pixels, each of said sub-pixels defining a controlled discharge volume at the intersection of said address electrodes and sustainer electrode pairs with associated auxiliary electrodes;

a phosphor material deposited within each micro-void and associated with said address electrodes;

a gas filling said micro-voids;

there being appropriated voltages applied to the electrodes to maintain an established plasma discharge in at least one sub-cell;

(b) applying in an addressing period a first auxiliary voltage waveform in conjunction with an address voltage waveform sequentially for each auxiliary voltage waveform supply connected by pads to corresponding first auxiliary electrodes selectively initiating discharges between associated first and second sustain electrode pairs, thereby setting the wall charge on the dielectric surfaces associated with said sustainer electrodes corresponding to the controlled

discharge volumes of selected sub-cells to values appropriate to an "off" state; and

(c) applying in a subsequent sustaining period a pre-determined number of voltage pulses via first and second sustain waveform supplies thereby creating the pre-determined number of discharges in a sequence corresponding to said voltage pulses in cells set to an "on" state, said discharges controlled in position and shape by auxiliary voltage waveform supplies.